

# Unit 13 Transformations

Jan 4-10:06 AM

## Unit 13: Transformations

### I. Transformations

A. Transformation: the operation that *maps* (or moves) the preimage onto the image.

1. Preimage: the original figure (pt A)

2. Image: the resulting figure (pt A')

$$A \longrightarrow A'$$

(A maps to A')

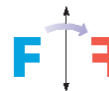
B. Four basic transformations

1. Reflection -

2. Rotation -

3. Translation -

4. Dilation -



Reflection in a line



Rotation about a point



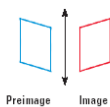
Translation

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C. Isometry: a transformation in which the preimage and the image are congruent.

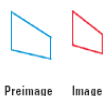
Which of the following transformations appear to be isometries?

a.



Preimage Image

b.



Preimage Image

c.

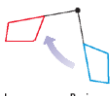
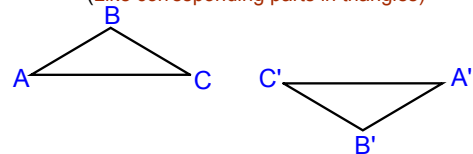


Image Preimage

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D. Mapping figures

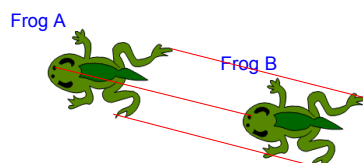
If  $\triangle ABC$  is mapped to  $\triangle A'B'C'$  ( $\triangle ABC \rightarrow \triangle A'B'C'$ )  
(Like corresponding parts in triangles)



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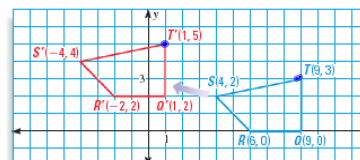
## II. Translations

A. Translation: an isometry that maps all points of a figure the same distance in the same direction.-SLIDE



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3. In the diagram, QRST maps onto Q'R'S'T' by a translation. Write the component form of the vector that can be used to describe the translation.



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**VECTORS** The vertices of the image of  $GHIK$  after a translation are given. Choose the vector that describes the translation.

A.  $\overrightarrow{PQ} = \langle 1, -3 \rangle$   
 B.  $\overrightarrow{PQ} = \langle 0, 1 \rangle$   
 C.  $\overrightarrow{PQ} = \langle -1, -3 \rangle$   
 D.  $\overrightarrow{PQ} = \langle 6, -1 \rangle$

4.  $G'(-6, 1), H'(-3, 2), I'(-4, -1), K'(-7, -2)$

5.  $G'(-4, 1), H'(-1, 2), I'(-2, -1), K'(-5, -2)$

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**C. Coordinate notation:** used to describe a translation in a coordinate plane.  
 $(x, y) \longrightarrow (x + a, y + b)$

Sketch a triangle with vertices  $A(-1, -3)$ ,  $B(1, -1)$ , and  $C(-1, 0)$ .  
 Then sketch the image of the triangle after the translation  
 $(x, y) \rightarrow (x - 3, y + 4)$

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**III. Reflections**

A. Reflection: a transformation using a line that acts like a mirror.  
 B. Line of Reflection: the mirror line.

Graph the given reflection.

a.  $H(2, 2)$  in the x-axis  
 b.  $G(5, 4)$  in the line  $y = 4$

C. A reflection is an isometry.  
 D. A reflection in two parallel lines is a translation.

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**VII. Symmetry**

**A. Reflectional Symmetry:** an isometry with a line of reflection.

- Line of Symmetry: a line in which the figure is reflected; its image is itself.
- Reflectional Symmetry is also called Line symmetry

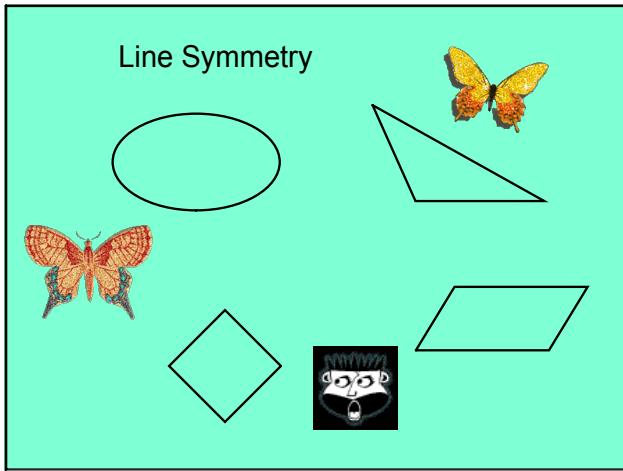
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**B. Rotational Symmetry**  
 A figure has rotational symmetry if the figure can be mapped onto itself by a clockwise rotation of  $180^\circ$  or less.

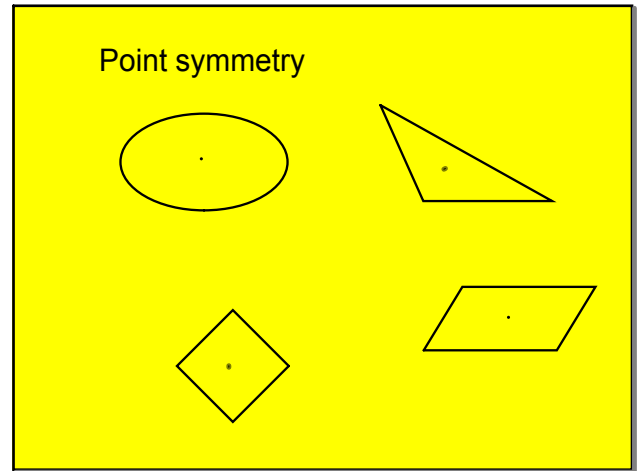
**C. Point Symmetry**  
 A figure has point symmetry if a point is the midpoint of all segments in the figure

Which has rotational and/or point symmetry?

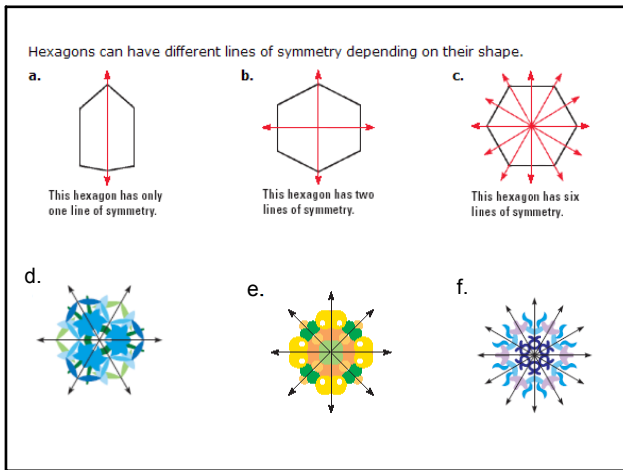
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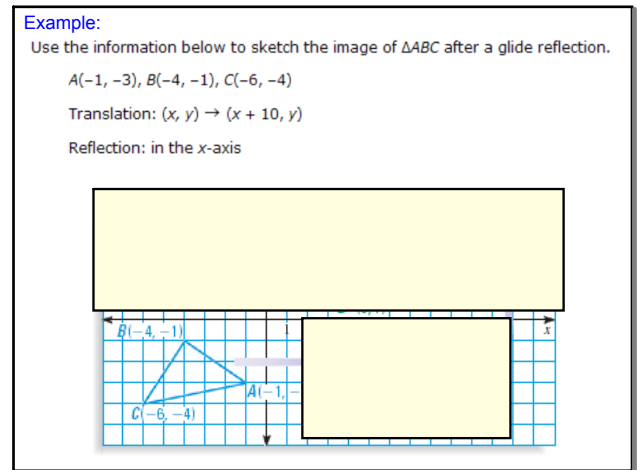
Sep 22-8:40 AM



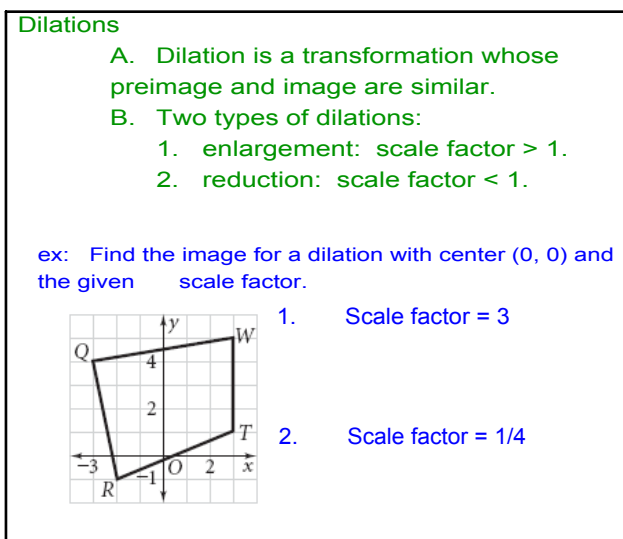
Sep 22-8:40 AM



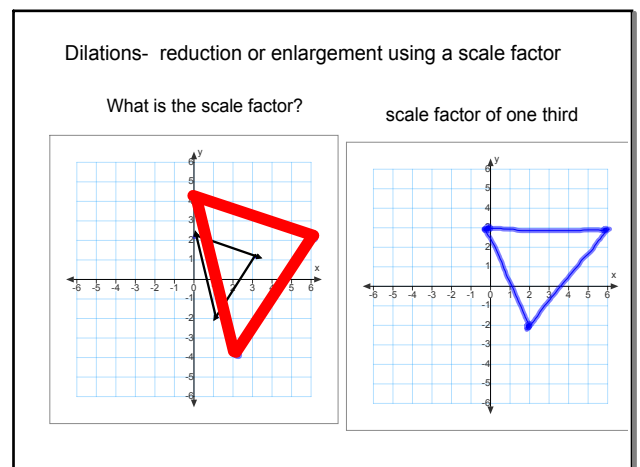
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May 7-8:59 AM



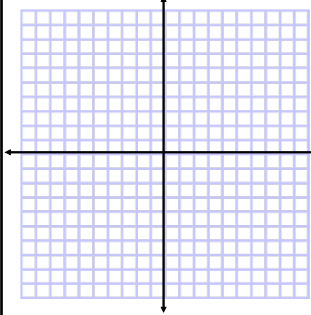
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## Rotation

A. Rotation: a transformation in which a figure is turned about a fixed point.

B. Center of Rotation: the fixed point of rotation.

C. Angle of Rotation: the angle formed by rays drawn from the center of rotation to a point and its image.



A(-2, -1)	A'(     )
B(-5, 1)	B'(     )
C(-4, 5)	C'(     )
D(-1, 2)	D'(     )

Ex: Sketch the quadrilateral with vertices:  
A(-2, -1) B(-5, 1) C(-4, 5) D(-1, 2)  
Rotate 90° clockwise about the origin.  
What are the coordinates of the image?  
A'(     ) B'(     )  
C'(     ) D'(     )

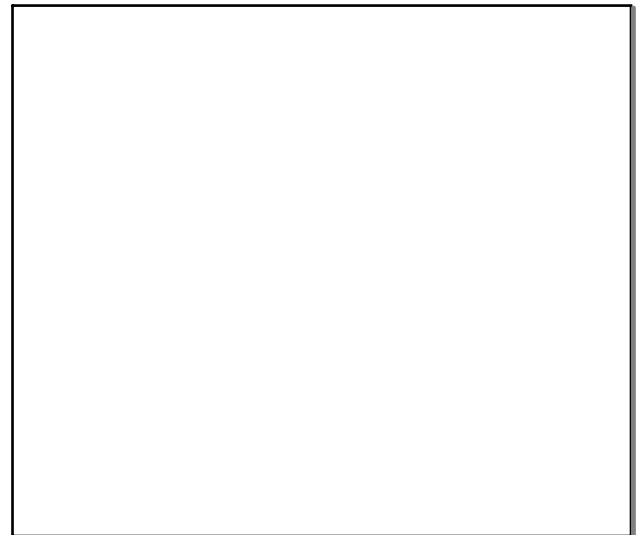
D. A reflection in two intersecting lines is a rotation.

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